REMARKS

Currently pending claims 1-18 and 40-41 are for consideration by the Examiner. Claims 1 and 18 were previously amended prior to the present office action response. No claims are amended herein in the present office action response.

The Examiner rejected claims 1-6, 9-11, 13-14, 16-18, and 40-41 under 35 U.S.C. §103(a) as being unpatentable over Somaki et al. (5,641,113) in view of Akamatsu et al. (5,611,481).

The Examiner rejected claims 7-8, 12, and 15 under 35 U.S.C. §103(a) as being unpatentable over Somaki in view of Akamatsu as applied to claims 1-6, 9-11, and 13-14 above, and further in view of Thomas (6,213,347).

Applicants respectfully traverse the 35 U.S.C. §103 rejections with the following arguments.

35 U.S.C. §103

The Examiner rejected claims 1-6, 9-11, 13-14, 16-18, and 40-41 under 35 U.S.C. §103(a) as being unpatentable over Somaki et al. (5,641,113) in view of Akamatsu et al. (5,611,481). The Examiner alleges that "Somaki discloses an electrical structure, comprising: a first substrate comprising a chip (Fig. 2A-3 el. 11; col. 4 lines 4-5); a first conductive body comprising a solder bump (el. 13a; col. 5 lines 1-2) coupled to said first substrate; an epoxy material (el. 14; col. 5 lines 15-21) that volumetrically surrounds and contact a first portion of a surface of said first and third conductive bodies such that a second portion of the surface of said

first and third conductive bodies is not contacted by said epoxy material, and wherein said epoxy material is continuous between said first and third conductive bodies (Figs. 2C, 2D); a second conductive body (el.13b) coupled to said first conductive body at said second portion; a fourth conductive body (el. 13b) coupled to said third conductive body at said second portion; and a second substrate comprising a circuit card (el. 20; col. 6 lines 59-61) coupled to said second and fourth conductive bodies; wherein a height of said second conductive body is at least 50% of a height of said solder bump (Fig. 2E), and wherein an area of said first portion exceeds an area of said second portion by a factor of about 10 (Fig. 2D), and wherein a height of said second conductive body is at least 3 mils (col. 6 lines 31-34). Somaki also discloses an epoxy material (el. 34) applied to the second layer of conductive bodies, which implies that said epoxy material could be equally applied to the second or top layer of conductive bodies which are coupled to the second substrate (col. 5 lines 38-42; col. 8 lines 15-17). Somaki also discloses that said epoxy material is rigid at the melting point of the first and third conductive bodies (col. 6 lines 34-41)."

The Examiner also alleges that "[h]owever, Somaki does not disclose a second conductive body whose melting point is less than a melting point of said first conductive body. Akamatsu discloses a flip chip device wherein the chip is coupled to the substrate using two stacked layers of conductive bodies wherein the melting point of one conductive body exceeds the melting point of a second conductive body by no more than about 147 degrees C (col. 4 lines 4-16). Therefore, it would have been obvious to a person skilled in the art at the time of the invention to use the conductive bodies of different melting points of Akamatsu with the electrical structure of Somaki in order to avoid repellency of molten soldering metal by the electrode surface, and thereby reduce electric resistance and increase mechanical strength of the connection

(Akamatsu - col. 4 lines 17-27)."

The Examiner further alleges that "Akamatsu also discloses a eutectic lead/tin ratio conductive body and a lead/tin ratio conductive body that exceeds a eutectic lead/tin ratio (col. 4 lines 4-16); and a ceramic substrate (col. 5 lines 25-31)."

Applicants respectfully contend that claims 1 and 18 are not unpatentable over Somaki in view of Akamatsu based on any of several arguments.

A first argument that claims 1 and 18 are not unpatentable over Somaki in view of Akamatsu relates to the coupling between the first and third conductive bodies 13a (as identified by the Examiner) and the second and fourth conductive bodies 13b (as identified by the Examiner), respectively, in Somaki. Claim 1 requires: "a second conductive body mechanically and electrically coupled to the first conductive body by **surface adhesion** at between a surface of the second conductive body and the second portion of the surface of the first conductive body" and "a fourth conductive body mechanically and electrically coupled to the third conductive body by **surface adhesion** between a surface of the fourth conductive body and the second portion of the surface of the third conductive body" (emphasis added). Claim 18 similarly "means for mechanically and electrically coupling the second conductive body to the first conductive body by **surface adhesion** between a surface of the second conductive body and the second portion of the surface of the first conductive body" and "means for mechanically and electrically coupling the fourth conductive body to the third conductive body by **surface adhesion** between a surface of the fourth conductive body and the second portion of the surface of the third conductive body"

(emphasis added). Somaki does not teach or suggest said surface adhesion between the conductive bodies 13a and the respective conductive bodies 13b. Moreover, said surface adhesion is physically impossible in the Somaki, by virtue of the disclosure in col. 6, lines 47-50 of Somaki which states: "In FIG. 2E, the **boundary lines** between the solder bumps 13a and 13b are actually **invisible** by reason that the solder bumps 13a and 13b are **molten and mixed** each other in this embodiment" (emphasis added).

A second argument that claims 1 and 18 are not unpatentable over Somaki in view of Akamatsu is that the Examiner has not even alleged that Somaki teaches or suggests said surface adhesion feature of claims 1 and 18. Thus, the Examiner has not satisfied his burden to show that the cited references teach or suggest all features of claims 1 and 18. Accordingly, Applicants respectfully contend that the Examiner has not made a *prima facie* case of obviousness in relation to claims 1 and 18, and there the rejection of claims 1 and 18 is improper.

A third argument that claims 1 and 18 are not unpatentable over Somaki in view of Akamatsu relates to the Examiner's rationale for combining Somaki and Akamatsu based on the Examiner's allegation that Akamatsu discloses that the melting point of the second conductive body is less than the melting point of the first conductive body as required by claims 1 and 18. The Examiner argues that "it would have been obvious to a person skilled in the art at the time of the invention to use the conductive bodies of different melting points of Akamatsu with the electrical structure of Somaki in order to avoid repellency of molten soldering metal by the electrode surface." Akamatsu discloses, however, that such repellency of molten soldering metal by the electrode surface occurs if the electrode is made of aluminum (see Akamatsu, col. 3, lines

32-35) and does not occur if the electrode is made of copper (see Akamatsu, col. 3, lines 35-38). Applicants contend that the electrodes 12 in Somaki are not disclosed by Somaki as including aluminum. In fact, Somaki purposefully intends that the conductive bodies 13a fully melt in a manner that enables the conductive bodies 13a to adhere to the corresponding electrodes 12, which could not occur if the electrode 12 repels the molten solder. See Somaki, col. 4, line 64 - col. 5, line2 which states: "In operation, temperatures in the oven and conveyor speed are controlled adequately to solder the solder baits onto the external electrodes 12 at 230 degrees C. After the reflowing step, solder bumps 13a are formed and **engaged abuttingly** corresponding external electrodes 12, as shown in FIG. 2" (emphasis added). Thus Somaki requires the conductive bodies 13a to be molten while in contact with the electrodes 13a and therefore inherently assumes that the electrodes 12 are made of a material that does not repel molten solder. Therefore, the Examiner's rationale for combining Somaki and Akamatsu is inconsistent with the process described in Somaki and does not constitute a persuasive argument for combining Somaki and Akamatsu.

Based on the preceding arguments, Applicants respectfully maintain that claims 1 and 18 are not unpatentable over Somaki in view of Akamatsu, and that claims 1 and 18 are in condition for allowance. Since claims 2-17 and 40 depend from claim 1, Applicants contend that claims 2-17 and 40 are likewise in condition for allowance. Since claim 41 depends from claim 18, Applicants contend that claim 41 is likewise in condition for allowance.

CONCLUSION

Based on the preceding arguments, Applicants respectfully contend claims 1-18 and 40-41 are in condition for allowance. If the Examiner believes that anything further is necessary in order to place the application in better condition for allowance, the Examiner is requested to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,

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